Undergraduate study in Computer Science

Computing is the science of information and communication. Only by understanding its laws can we unlock the full potential of computers to change our lives.

Professor Jeremy Wyatt
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Learn more

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Come along to an Open Day:
www.birmingham.ac.uk/opendays
Welcome

The University of Birmingham is a great university in a vibrant city. Founded as England’s first truly ‘civic’ university over a century ago and set in a glorious campus close to the centre of England’s second city, the University of Birmingham is now not only one of Britain’s leading universities, but internationally acclaimed and globally recognised.

‘I am delighted that you are considering undergraduate study at Birmingham and I hope you find this guide useful when making what is, undoubtedly, a life changing decision.

The School of Computer Science provides specialist teaching and conducts cutting-edge research in fundamental and applied computer science, artificial intelligence, optimisation, computer security, and robotics. Led by academics at the forefront of their fields, we deliver outstanding education and offer comprehensive careers support to ensure an exciting range of career opportunities for our alumni.

We are eager to receive applications from highly motivated and well-qualified students and hope that this guide will provide you with adequate information on the variety of Computer Science degrees offered, and the opportunities available to you after you graduate. It is important that you choose a degree programme to suit your future career aspirations and that you choose a university and school where you will be happy and able to fulfil your potential. One of the best ways to make this decision is to visit the university to explore, enquire and listen first hand to what life is really like at Birmingham and we very much hope you will be able to attend one of our admissions events.

The Computer Science Admissions Team are here to support you in your decision, and there will be a number of occasions when you will have the opportunity to visit the school and to talk to us. University Open Days are scheduled throughout the year and as a Computer Science applicant, you will be invited to attend an informative ‘ Applicant Visit Day’ to assist your decision-making. If you have any questions in the mean time however, please do not hesitate to contact us and we’ll do all that we can to help.

I wish you every success with your studies and hope to welcome you to Birmingham in the near future.’

Professor Jonathan Rowe
Head of the School of Computer Science

‘My four years at Birmingham have been very pleasant. The School of Computer Science is a fantastic community in which to learn, and my degree here has been a pleasure. The staff have been inclusive and accessible and student feedback has always been both listened to and acted upon. Although I will be sad to go, I am very pleased with the placements I undertook and the graduate job I have obtained.’

Horatio Caine, BSc Computer Science with a Year in Industry, Graduate position with Bloomberg
What is Computer Science?

Computers are a core part of our lives: social networking, media streaming, computer games, office applications and online shopping are all obvious examples of things that computer science has brought us that many people are very familiar with.

It is a popular view that Computer Science is about developing and building new and improved consumer products and technologies, and of course it has a vital role to place in this area. Computer Science is at the heart of 21st century commerce and industry, with almost every business using computers in some way. Large businesses will often devote a substantial proportion of their operating budget to the development of computer systems that aid in the management of the company; for example, by keeping track of stock levels or managing delivery schedules.

But Computer Science is about so much more than this. At its most fundamental level, it is about information and how to represent, store, communicate, manipulate, understand and make use of it. This can have a far more significant impact than the use of computers to perform comparatively simple housekeeping tasks.

Computational Thinking
Information is a tremendously valuable commodity, and there is a vast industry dedicated to making sense of it: from generating adverts specific to your interests on social networking sites to identifying trends in financial markets. Computer Science is at the heart of this industry. The role of the computer scientist in this process is not just about writing computer programmes to perform a particular task (although this can be a significant part of what computer scientists do), it is about developing new ways of thinking about information, and what you can do with it. This can have a profound impact on other areas of science and engineering, and also on humanities, social sciences and business.

'Computer Science provides a completely new set of challenges; a science which opens up not one, but several spectacles in to the future of technology and its impact on the world.'

Jawad Hussain, BSc Computer Science with a Year in Industry
Thinking about problems from a computational perspective is leading to fundamental new insights in other areas and allows us to:
- Extract the crucial features from very large datasets such as those generated in the search for the Higgs boson at the Large Hadron Collider
- Use computer simulations to work out how the flocking behaviour of birds emerges from the actions of intelligent individuals
- Develop new designer drugs for cancer
- Understand how the brain works, through the analysis of artificial neural networks, and by drawing on our knowledge of information processing to formulate a ‘Computational Theory of Mind’
- Analyse data from social networks and mobile systems in order to understand the movements and motivations of people
- Model and analyse business processes to understand how to improve the efficiency of a company’s operations

So, at its most fundamental level Computer Science is about understanding, analysing, and designing information processing systems. This is a complex multi-faceted process that can involve mathematical analysis, engineering, human factors and ethical considerations.

A Computer Science degree could lead to a tremendous variety of careers: you could be helping to develop the next generation of social networks; writing a sophisticated motor racing game (or even a Formula 1 simulator); working out the structure of proteins; developing software for financial trading; predicting the weather; modelling the effect of brain injuries, amongst many, many other possibilities. The proliferation of information, and the pressing need and desire to understand it will only lead to an increase in the demand for skilled computer scientists to develop new ways of thinking.

'A key part of Computer Science is building software with which people can interact. Social media and mobile computing require computer scientists to understand not only the technology but also how people think and communicate. Trained to think rigorously about algorithms and processes you will possess one of the key skills required in industry, commerce and academia.'

Andrew Howes, Professor of Computer Science
Why Birmingham?

Birmingham has a long history of research excellence, a stunning campus with exceptional facilities, and offers students a culturally diverse academic experience, set within one of the most vibrant cities in Europe.

Situated in the heart of England, the University was founded over 100 years ago and has a long tradition of discovery, invention and design across all of the major academic subjects. The University has strong links with industry and we are one of the top six universities that major companies target when they are recruiting. If you join us, you will enter a community of more than 16,000 undergraduate students; almost 70% of which receive a first or upper-second-class degree every year.

We understand that choosing the right university is one of the most important decisions you will make, so here are a few more reasons why the University of Birmingham may be right for you:

- We are an internationally-recognised, research-led institution, with over 100 years of achievement. The recent Research Excellence Framework 2014 showed that more than 81% of all research carried out by the University is rated as ‘world leading’ or ‘internationally excellent’ in terms of its originality, significance and rigour.*
- We offer teaching from academics who are global experts in their field, with eight Nobel Prize winners amongst our alumni and academic staff.
- The University is investing £400 million over the next five years to transform our famous Edgbaston campus with new facilities that will be for the benefit of our students, staff and visitors. The University will deliver the city’s first 50 metre swimming pool in a brand new sports centre, create an outstanding academic library with a cultural student hub and open up a striking green park at the heart of campus. The University is also investing in brand new Halls of Residence at our Student Village and will continue its commitment to high-quality design and sustainable regeneration.
- Birmingham is one of a few Universities that is unique in having a large, central campus environment that is incredibly close to the city centre. Our beautiful 243 acre parkland campus offers students a safe, friendly environment with all the facilities of a small town – including bars, cafes, shops, banks, an art gallery, a brand new music hall, museums, a doctor’s surgery and our very own railway station, which is only two stops away from Birmingham’s central New Street train station.
- Our Fresher’s Guarantee Scheme for first year students means that we offer guaranteed University accommodation or a nominated bedspace in third-party accommodation to all new students. (For the conditions of the Fresher’s Guarantee Scheme see www.birmingham.ac.uk/accommodation.)
- With 4,500 overseas students from nearly 150 different countries, we are home to one of the largest communities of international students in the UK, with a network of 150,000 alumni throughout the world.
- We are a top three sporting university and have some of the best facilities in the country, as well as professional coaching and imaginative health and fitness programmes, which offer a range of sporting opportunities to suit all tastes and ability levels. Learn more: www.birmingham.ac.uk/students/sport
- Our students benefit from living in one of Europe’s most vibrant cities: Birmingham has been transformed in the last 20 years to become a confident, modern commercial regional capital and one of the most culturally diverse cities in Britain.

* REF 2014 results

In my last few years of school in Lithuania, Computer Science was the subject that interested me the most. Being a relatively new field it is constantly changing and is very dynamic. Having so much passion for the subject I wanted to study, I really wanted to get the best education possible – Birmingham ticked all the boxes.

Goda Bieksaite, 2nd Year, MSci Computer Science
‘An oasis of green space and red brick amid the bustle of England’s second biggest city. Set in 250 acres of parkland, the main campus is largely self-contained with lawns, trees and a lake.’

*The Independent*
Birmingham has been transformed into a city for young professionals and is one of Europe’s most exciting destinations. It is more than somewhere to study; it is somewhere to build a successful career.

Birmingham is a modern, fascinating city. Famous for its historical industrial past it is now a centre of arts and culture, commerce and entertainment, with a vibrant and diverse community. Birmingham is home to the largest financial services and creative sectors outside London. The thriving business community offers you a wealth of opportunities when you join the job market, and around 40% of Birmingham graduates choose to make their home here after leaving university.

For more information on student life in Birmingham, visit: www.visitbirmingham.com/what-to-do/for-students where real Birmingham students will give you their opinions on everything from nightlife to culture and relaxation. View photos, read blogs watch films and sign up for their newsletter.

Modern city
Around £9 billion has already been ploughed into the city centre over the past 20 years and Birmingham continues to attract significant investment. The landscape of the area has changed significantly and more areas of the city are regularly being regenerated and transformed.

Birmingham is home to one of Europe’s largest shopping centres; the award-winning Bullring, with over 160 shops, restaurants and bars, including the iconic Selfridges building. It is also home to the Mailbox, a unique development that brings together designer fashion and lifestyle shops, luxury apartments, hotels and an array of restaurants and café bars. The Mailbox is also home to BBC Midlands’ television and radio. The city has also invested in a brand new central New Street station, serving over 140,000 passengers a day. Birmingham has excellent transport links to other parts of the UK, is a half an hour taxi ride to Birmingham International Airport and is only 90 minutes away from London via train.

Shopping, entertainment and culture in Birmingham
Although Birmingham is facing the future, it is still proud to showcase its past. The city
Factfile: The city of Birmingham

- A £96 billion regional economy makes the city a major engine of UK growth outside of London
- Birmingham is the ‘youngest’ city in Europe, with under 25s accounting for nearly 40% of its population
- Birmingham is home to some of the largest clinical trials clusters in the UK – helping to transform world-class cancer research into improved patient survival
- The Forensic Science Service pioneered the use of large scale DNA profiling and set up the world’s first DNA database from their laboratories in Birmingham
- Birmingham have over 8,000 acres of parks and open space, making it one of the greenest cities in the UK
- Sustainability: 80% of Birmingham’s new buildings are regarded as ‘Excellent’ by the environmental measurement rating BREEAM
- Air, road and rail connections provide access to 400 million people across Europe

Information courtesy of Marketing Birmingham.

was the hub of the industrial revolution and areas such as the historic Jewellery Quarter keep traditions alive. The canals are now fringed with bars and restaurants, and many visitors are excited by the city’s bustling nightlife.

There are more than 500 restaurants offering a vast range of international cuisine. After enjoying a meal, you could go for drinks or watch some of the best comedians on the circuit at the Glee Club. If you prefer live music, Birmingham has a number of leading venues for bands and local talent, including The Barclaycard Arena and The Genting Arena.

Birmingham is also home to one of the UK’s finest concert halls, Symphony Hall, where the City of Birmingham Symphony Orchestra is based, and Birmingham Hippodrome, where the Birmingham Royal Ballet is based. The city centre also has three other theatres and a number of cinemas, including the 30-screen ‘Vue’ at Star City, which shows the latest Asian and mainstream films under one roof.

In 2013 the new Library of Birmingham opened in Centenary Square. The library is 31,000 square metres, making it one of the largest public libraries in the world. Connected with Birmingham Repertory Theatre (The REP) there are always events and shows happening. Visit www.libraryofbirmingham.com for more information.

Sporting city
Birmingham is home to Premier League football clubs Aston Villa and Birmingham City and in recent years it has staged more sporting championships than any other UK city. The Warwickshire County Cricket ground, close to the University in Edgbaston, regularly hosts test matches and international tournaments including the Cricket World Cup. The city also boasts many golf courses, including The Belfry, which has hosted the Ryder Cup four times.

Welcoming city
There is something for everyone in Birmingham and you will get a warm welcome in one of the most culturally diverse cities in Britain. People from all over the world live, work and play here as part of a citywide community which has been harmonious and tolerant over many years. Our long record of industry and innovation contributes to the exciting and dynamic atmosphere of our historic city.
Why Computer Science at Birmingham?

Birmingham is one of the top universities for studying computer science in the UK, with a strong international reputation for excellence in teaching and research. We offer a broad range of flexible courses giving the opportunity for a challenging academic experience.

Teaching and research excellence
Our academic community consists of people working at the forefront of their subject. This benefits you directly as their cutting-edge research feeds into our undergraduate teaching, and gives you the chance to learn from innovative developments as they are being made.

The Guardian League Table 2016 has ranked our School fourth out of all UK Institutions offering Computer Science and IT (with a 96% course satisfaction rate). The Complete University Guide 2016 has also placed our School as one of the top ten Computer Science Departments in the UK, ranking us highly for research and graduate prospects and 2nd place for student satisfaction from the Russell Group Universities.

We have the highest possible rating for our computer science teaching (from the QAA – Quality Assurance Agency for Higher Education) and we are currently ranked 8th by the 2014 Research Excellence Framework (REF) for the quality of our research intensity.

Our School has various Research Groups (AI/Robotics, Natural Computation, Medical Imaging, HCI, Security and Theory of Computation). We are also home to the Centre of Excellence for Research in Computational Intelligence and Applications (CERCIA); The Human-Computer Interaction Centre (HCI), and the Centre for Computational Neuroscience and Cognitive Robotics (CNCR).

Our Security and Privacy Group is also recognised as an EPSRC/GCHQ Academic Centre of Excellence in Cybersecurity Research and we have a strong collaboration with the Centre for Computational Biology (CCB). Our Security and Privacy Group is also recognised as an EPSRC/GCHQ Academic Centre of Excellence in Cybersecurity Research and we have a strong collaboration with the Centre for Computational Biology (CCB).

Rewarding excellence
If you choose the School of Computer Science at Birmingham, you will be choosing one of the top ranking computer science departments in the UK and, as such, we want to attract the best students. We recognise and reward excellence, with competitive school-specific academic scholarships available for our brightest students.

Course flexibility
At this point in time, the most important thing is for you to choose a programme that meets your future career aspirations. Once you have selected an undergraduate degree programme, you will find that it is carefully structured to allow you as much choice as possible, while making sure you take core modules to achieve a solid base in the subject.

There is considerable flexibility built into the system with the core modules of the first year being shared between the BSc Computer Science, MSci in Computer Science, MEng Computer Science and Software Engineering, and the BSc: Artificial Intelligence and Computer Science. This flexibility lets you decide which programme best suits you before making a final choice. It also allows your course and career direction to be moulded as your ideas and interests evolve.

Student support
Our School received our best ever results with an overall satisfaction score of 96% in the National Student Survey Results 2014 (in Teaching, Academic Support, Organisation, Management, Assessment, Learning Resources and Personal Development), placing us 2nd from the Russell Group Universities*.

To help you settle into your first year, all students are paired with an existing student on a mentor-scheme and a member of staff is also allocated as your personal tutor for academic-related issues. In addition, the student/staff committee provides a useful forum for raising issues and the student-lead Computer Science Society (CSS), offers support and organises varied social events.

We also have five welfare tutors who provide a welfare session each day during which time any student can drop in and have a chat.

There are over 200 different clubs and societies to get involved with through our Guild of Students. The University has its own internal student recruitment agency; Worklink and many of our students also act as ambassadors at Computer Science events, for which they are paid.

Course flexibility
As a student in the School of Computer Science you will be based within a purpose built multi-million pound building, which offers 24-hour swipe card access to an impressive range of state-of-the-art facilities. These include:

- Dedicated exclusive computing labs for Computer Science students only
- Teaching labs for Robotics
- Research labs for Medical Imaging, Intelligent Robotics, HCI and Security
- Full wireless network
- Bookable seminar and meeting rooms
- Student areas (with power access)

Contact us
Our current students and alumni are happy to answer any questions you might have about life and study in Computer Science at Birmingham. Please contact: ug-admissions@cs.bham.ac.uk for details of our ‘New Applicant Facebook Group’.

* National Student Survey Results 2014.

‘I treasure my time at Birmingham. My degree equipped me with the computer science theory as well as more practical software engineering skills. Birmingham provided an excellent foundation for my career.’

Ernest Wong, Senior Web Developer, Yahoo! Holdings, BSc Computer Science and Software Engineering
We offer a wide network of links that can help you to secure a year in industry, a placement or even a graduate position. Plus, senior speakers from these organisations give specialist lectures throughout the year. We also boast research partnerships with many blue-chip companies including; BT Exact, Honda, HP, Marconi, QinetiQ, Rolls Royce, Severn Trent and Sony.

Employer opinion
A University of Birmingham degree is an excellent qualification for securing a good job. Birmingham is one of the top universities often targeted by prestigious and established companies when looking for new employees. So, whilst the end of your degree may be a while off, it is worth considering that the University of Birmingham will give you the specialist knowledge and transferable skills that will make you attractive to potential employers in what is an increasingly competitive job market.

Professional Exemption and Accreditation
All our undergraduate degree programmes are accredited by the British Computer Society (BCS) which is recognised by the Engineering Council for purposes of registration as a Chartered Engineer (CEng).

Award-winning development
At the School of Computer Science we are not just renowned for teaching and research excellence. We also produce novel solutions for real-world applications. We work with Jaguar Land Rover to make their vehicles more secure, and have contributed to the development of the Trusted Platform Module which makes many of our computers capable of secure cryptographic operations. We have deployed autonomous, intelligent robots in security and health support facilities, and work closely with the nuclear industry to use similar systems to help speed up nuclear decommissioning. We are also proud to have developed a revolutionary, award-winning method for diagnosing skin cancer.

Business and industry links
At the School of Computer Science we organise events and support services to help you refine your career options. Support is tailored to your chosen subject area and draws on our excellent range of resources. We hold specialist Careers Fairs throughout the year (including our Software, Systems and Emerging Technology Fair and Financial Computing and Consultancy Fair). We have strong local and national relationships with major industry players from the public and private sector. These companies range from Accenture, Goldman Sachs to IBM and Logica.
Studying Computer Science at Birmingham

Computer Science at Birmingham dates back to the late 1950s. The School of Computer Science was one of the first academic departments in the UK to undertake research and teaching in this field. Some 60 years later, we now provide specialist teaching and conduct world-leading research in fundamental and applied computer science, artificial intelligence, optimisation, computer security and robotics.

As an undergraduate student within the School of Computer Science you will be taught by academics at the forefront of their fields and will benefit from an industry-informed curriculum that is appropriately accredited by the British Computer Society (BCS).

You will develop a high level of practical skills and will have the opportunity to build significant specialist knowledge in applied computer science, whilst maintaining the flexibility to follow your interest through the optional modules on offer.

Below you will find an overview of the programme and application details for all five of our undergraduate programmes. Please do not hesitate to contact our Undergraduate Admissions Team should you require any further information.

<table>
<thead>
<tr>
<th>Programme Title</th>
<th>Computer Science</th>
<th>Computer Science</th>
<th>Computer Science and Software Engineering</th>
<th>Artificial Intelligence and Computer Science</th>
<th>Computer Science with Business Management</th>
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<tr>
<td>Award</td>
<td>BSc</td>
<td>MSci</td>
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<td>BSc</td>
<td>BSc</td>
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<tr>
<td>UCAS Code and duration</td>
<td>G400 – 3 years</td>
<td>I101 – 4 years</td>
<td>GG46 – 4 years</td>
<td>GG47 – 3 years</td>
<td>G4N1 – 3 years</td>
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<td>G401 – 4 years</td>
<td>I103 – 5 years</td>
<td>GG6L – 5 years</td>
<td>GG74 – 4 years</td>
<td>GKN1 – 4 years</td>
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<td>I10A – 4 years</td>
<td>I102 – 5 years</td>
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<td>(with Study Abroad)</td>
<td>(with Study Abroad)</td>
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<tr>
<td>Teaching quality</td>
<td>QAA: Excellent</td>
<td>New programme</td>
<td>QAA: Excellent</td>
<td>QAA: Excellent</td>
<td>QAA: Excellent</td>
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Entry requirements

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<tr>
<th>A Level grades</th>
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<th>AAA</th>
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<tr>
<td>A Level/GCSE subjects</td>
<td>Grade A required in either A Level Mathematics or Computing</td>
<td>Grade A required in either A Level Mathematics or Computing</td>
<td>Grade A required in either A Level Mathematics or Computing</td>
<td>Grade A required in either A Level Mathematics or Computing</td>
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<td>Grade B required in GCSE Mathematics if not offered at A Level</td>
<td>Grade B required in GCSE Mathematics if not offered at A Level</td>
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<td>Grade C required in GCSE English</td>
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<td>Grade C required in GCSE English</td>
<td>Grade C required in GCSE English</td>
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</table>

General Studies accepted? | No | No | No | No | No

Equivalent qualifications (including the International Baccalaureate) will be considered. To find out more and discover whether your qualification is suitable (including those offered from outside the UK), please see our website or contact the Undergraduate Admissions Team using the details above.

This brochure was written several months in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that because our research is constantly exploring new areas and directions of study, some modules may be withdrawn and new ones offered in their place.
Undergraduate degrees in Computer Science

Full details on all undergraduate degrees in computer science can be found at www.cs.bham.ac.uk/admissions/undergraduate

BSc Computer Science (G400)
This will provide you with a balance of computer science, artificial intelligence and practical software engineering. It will focus on analytical methods and technical skills and offer you the opportunity to combine knowledge and personal skills to undertake the research and development of software solutions to problems. You will learn about all kinds of computational systems, their theory, design, development and application. This includes programming languages, software engineering, artificial intelligence, operating systems, databases, nature-inspired computation, concurrent computing, robotics and the theory of computation.

MSci Computer Science (I101)
This is a four year single honours degree programme. Following the first two years in which course content is the same as the BSc Computer Science, third year students spend a quarter of their time on a project. In their fourth and final year, students have the unique opportunity to select modules from the School's portfolio of Masters programmes and even specialise in a particular field at Masters level. Additionally, students undertake an in-depth software project in their final year.

The course is designed to provide thorough coverage of Computer Science's core areas giving students a systematic grounding in both the theoretical underpinnings of the discipline and practical software development.

MEng Computer Science and Software Engineering (GG46)
Software engineering is concerned with how to build the very large software systems that are used throughout commerce and industry. Software engineers are the professionals behind this industry. As a software engineer you would lead the development of these very large systems so that they are delivered on time, within budget, and are both reliable and maintainable. Software engineering covers not only the technical aspects of building these software systems, but also management and teamwork skills.

In this degree, you learn all the fundamentals of computer science, with an emphasis on the skills required for successful software engineers. You begin with the fundamentals of computing and progress to comprehensive courses in software engineering, computer architecture, logic and the mathematical theory of computation.

BSc Artificial Intelligence and Computer Science (GG47)
Artificial Intelligence (AI) is a fascinating subject in which you build intelligent machines and study the nature of the mind. On the engineering side this field is especially relevant in today’s world because of the benefits of making computers perform tasks that normally require human intelligence. From a scientific viewpoint, artificial intelligence is a multidisciplinary field that connects with: computing, psychology, neuroscience, philosophy, mathematics and linguistics. This degree programme will give you all the computing skills you need to enter industry, whilst also allowing you to acquire scientific skills in order to pursue research.

We are one of the leading centres for AI teaching and research in Europe, which enables us to offer an unusually rich and innovative programme for undergraduate study. In Year One, you will learn about theories of mind and techniques for generating intelligent behaviour, and implement them as computer programs. In the second year, you take more advanced modules in specific areas of AI, including an Introduction to Natural Computation, Machine Learning, Computer Vision and Natural Language Processing.

In the Computer Science half of your degree you learn to program in a language called Java and will learn how to apply these skills.

BSc Computer Science with Business Management (G4N1)
There is a real demand for managers who have a thorough grasp of computer science as well as a clear understanding of management principles. This programme is designed to give you both.

This degree is taught jointly between the School of Computer Science and the Birmingham Business School. It will prepare you not only for the technical side of computing but also for a career in management, sales or marketing, especially one related to IT. In each year, you will spend one-third of your time in the Business School and two-thirds in the School of Computer Science.

Degrees in computing with another subject
Joint Honours Degrees are an increasingly popular choice. For details of our joint honours programme, go to page 28.

Degrees with a year in industry
All programmes including joint honours degrees, can be combined with a Year in Industry. This extra year is typically taken between years two and three of a three-year degree, and years three and four of a four-year degree and if successful leads to your degree title including ‘with a Year in Industry’. See page 29 for more details.

Degrees with International Study Opportunities
All students enrolled on the BSc or MSci in Computer Science programmes are entitled to pursue the opportunity to Study Abroad between years two and three of their degree. To learn about the benefits of choosing to Study Abroad see page 30.
Overview of Year One

We understand the pressures that many students can feel when faced with the prospect of deciding upon one specific route of study. Therefore all of our programmes have been carefully constructed to allow you as much flexibility as possible. Based around the study of core computer science principles, our Year One structure allows your course and career direction to be moulded as your ideas and interests evolve.

Year one syllabus

<table>
<thead>
<tr>
<th>Year 1 Modules</th>
<th>BSc Computer Science</th>
<th>MSc Computer Science</th>
<th>BSc Artificial Intelligence and Computer Science</th>
<th>BSc Computer Science with Business Management</th>
<th>MEng in Computer Science and Software Engineering</th>
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<td>Elements of Functional Computing</td>
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<td>Data Structures and Algorithms</td>
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<td>Introduction to AI</td>
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<td>Introduction to Mathematics for Computer Science</td>
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<td>Introduction to Software Engineering</td>
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<td>Introduction to Economics</td>
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<td>Business Organisation and Management</td>
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<td>Language and Logic</td>
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<tr>
<td>Robot Programming</td>
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<tr>
<td>Software Workshop 1</td>
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</table>

Elements of Functional Computing
This module will introduce the fundamental data structures of functional computing and recursive algorithms over inductively defined data types. Students will learn how to program in a declarative, side-effects-free style. Students will be introduced to complexity analysis and functional optimisation techniques such as tail recursion. Students will also be exposed to the basics of symbolic evaluation and structural induction as a means to prove properties of functional programs. The ideas will be presented both abstractly and concretely via a suitably chosen functional programming language.

Data Structures and Algorithms
This module will introduce the principal fundamental data structures and algorithms used in computer science. Data structures will be formulated to represent information in such a way that it can be conveniently and efficiently manipulated by the algorithms that are developed. The ideas will be presented abstractly, although examples will be given in the language used in the programming workshop module.

Software Workshop One
A first module in imperative, object-oriented programming with a strong emphasis on practical program development skills.

Introduction to Software Engineering
Covering the software lifecycle and methodologies for software development.

Language and Logic
Provides some of the knowledge and skills necessary for the rigorous communication of information via natural language as well as formal languages.

Introduction to AI
Covering its techniques and main subfields, and providing a foundation for further study in specific areas of artificial intelligence. The principal focus of this module is on the common underlying ideas, such as knowledge representation, rule-based systems, search and learning.

Introduction to Financial Analysis
The aim of the module is to introduce financial analysis techniques related to the appraisal of company financial performance. It will cover: the content and format of accounting statements, accounting concepts and valuation approaches; appraising company financial performance using ratio analysis and management accounting techniques of planning, operational control and decision making; and the uses, strengths and limitations of accounting information.

Business Organisation and Management
The aim of this module is to acquaint students with the theory and practice of managing organisations.

Introduction to Economics
The aim of the module is to provide a thorough grounding in microeconomics. It will cover: an introduction to alternative approaches to economics and socio-economics, demand and supply, elasticity, intervention in the market, marginal utility theory, production and cost analysis, market structure, perfect and imperfect competition, analysis of monopoly and oligopoly, and alternative theories of the firm.
Overview of Year Two

Year two syllabus

<table>
<thead>
<tr>
<th>Year 2 Modules</th>
<th>BSc Computer Science</th>
<th>MSc Computer Science</th>
<th>BSc Artificial Intelligence and Computer Science</th>
<th>BSc Computer Science with Business Management</th>
<th>MEng in Computer Science and Software Engineering</th>
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<tbody>
<tr>
<td>C/C++</td>
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<td>O</td>
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<tr>
<td>Computational Vision</td>
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<tr>
<td>Computer Systems and Architecture</td>
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<td>Functional Programming</td>
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<td>Financial Decision Making</td>
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<td>Global Marketing</td>
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<td>Human Resource Management</td>
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<tr>
<td>Introduction to Marketing</td>
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<tr>
<td>Introduction to Computer Security</td>
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<tr>
<td>Mathematical Techniques for Computer Science</td>
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<tr>
<td>Models of Computation</td>
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<td>Natural Language Processing 1</td>
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<td>Professional Computing</td>
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<td>Reasoning</td>
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<td>Software Engineering 2</td>
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<td>Software System Components 1</td>
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<td>L2 Language Modules</td>
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<tr>
<td>Team Project</td>
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</tbody>
</table>

Software System Components 1
This module presents more advanced software development techniques, enabling the design and development of programs of medium-scale size and complexity. Through a series of lab exercises, students apply concepts taught in lectures and at the same time practice the design and development of medium-scale programs. It is designed to equip students with programming abilities which may be needed in an individual final year project. The module covers the three topics of HCI, i/o, parsing and graphics.

Computer Systems and Architecture
Introduction to Hardware Engineering: outline of digital circuits, basic computer organisation and architecture (CPU, memory, i/o); control of peripherals and basics of networking.

Models of Computation
The module will introduce various automata theoretic models of computation and discuss their practical and theoretical significance. Finite automata, grammars and stack automata and Turing machines will be introduced. The fundamental ideas of (non-)computability and complexity will be presented. There will also be a section on the Lambda Calculus and its connection with Functional Programming.

Mathematical Techniques for Computer Science
Computer Science makes use of a variety of mathematical techniques to describe and solve computational problems. Often these techniques are quite deep and outside the scope of standard mathematical syllabuses; for example, the use of structural recursion in the analysis of data structures and programming languages. The module aims to present a core of mathematical techniques in a sample computational context, and tries to strike a balance between systematic introduction and an application-orientated 'maths-by-need' approach.

Software Engineering 1 and 2
These modules cover management of the software development process includes: how projects arise, choosing the right project, software life cycles, human factors in project management, basic project management techniques (eg, planning, estimating, monitoring progress) and advanced project management techniques (eg, risk management, configuration management, quality management, process improvement). Overview of requirements engineering; requirements elicitation and analysis, requirements definition and specification, requirements validation, requirements management, overview of specification techniques. Object-oriented analysis and design using Unified Modeling Language (UML) and patterns.
What interests you about Computer Science, and why did you decide to study it at UoB?

What attracted me to Computer Science is the idea of creating something that can ease someone’s workload/entertain them/help them be more organised. I chose this University because of its reputation, location and gorgeous campus. The facilities in the school are sufficient for all of my needs and more. I think the best facilities that the school offers are the 24 hour access and lab space. It means that I can do my work any time I like.

What are your experiences with the staff in the School?

The staff are also exceptionally friendly and approachable. They are always helpful and will happily chat to you about their work, the modules they are teaching, their interests – anything really.

What do you intend to do after graduation?

After graduating from Birmingham, I will be joining the Credit Suisse Graduate Programme in London. I had an internship with them between my second and third year of study, and received tremendous support from the Careers Service in finding this. An internship is a great way of putting things you’ve learnt at University into practice, earning a wage and forming relationships for the future.

International Economy

This module will cover: National income accounting, macroeconomic theory, theory of monetary and fiscal policy, exchange rate regimes, purchasing power parity and interest rate parity, and European monetary union.

Information and the Web

This module introduces some of the key technologies used on the internet and uses them to reinforce important concepts related to the representation and management of structured data. A team project allows students to really demonstrate their skills in a substantial piece of software development.

Robot Programming

This module teaches basic AI and robotic programming skills through a series of team exercises using small, mostly prebuilt, robots. Regular exercises will give each team the skills to build up a robot capable of tackling a competitive, arena-based, task that includes a variety of AI-requiring sub-problems.

Introduction to Mathematics for Computer Science

Provides a solid grounding in mathematics sufficient enough to understand a range of computer science topics.

This module takes all the relevant topics covered at GCSE and builds upon them to act as a foundation for further study of mathematics relevant to computer science.

‘The three years I spent studying at the University of Birmingham were some of the best years of my life. The tutors and staff are some of the friendliest and most intelligent people I have come across and I loved the diversity of the course modules.’

Selina Tindall, Team Lead Software Developer, Royal Bank of Scotland
(Markets & International Banking)
BSc Computer Science
Computational Vision
The module provides an introduction to computer vision, intended for students with some prior background in AI. Appropriate computational models, techniques and algorithms will be introduced so that students can both understand the relevant literature and construct simple software systems.

Natural Language Processing 1
The module presents an overview of Natural Language Processing and its applications followed by introductions to morphology, syntax and semantics. These topics are used to introduce some linguistic theory and appropriate algorithms for their computational implementation. Examples are mostly given using Prolog.

Financial Decision Making
This module examines investment projects using discounting methods under the conditions of certainty and risk using both traditional and portfolio methods. Demonstrates how to calculate and use cost of capital for geared companies, and how to evaluate leasing projects.

Introduction to Marketing
This module gives an introduction to marketing, the marketing environment, marketing functions and the 4 P’s of marketing.

Human Resource Management
This module explores the processes of planning for acquiring and utilising human resources in organisations.

Global Marketing
The module aims to provide an introduction to the issues involved with global marketing management, to critically analyse business topics and develop their own informed views.

L2 Language Modules
Language modules (at Level 2 or above) may only be chosen in order to continue study of a language successfully passed in Year One.

Functional Programming
The purpose of this module is to present the basic ideas of functional programming, to demonstrate the main elements of good programming style and to illustrate some of its uses and applications.

Professional Computing
The module introduces students to ethical, social, legal and professional issues in computing in combination with report writing skills. Student participation is an important component of the module, both in researching and presenting material. Some lectures are given by external speakers with appropriate professional experience.

C/C++
This module will introduce the C family of programming languages, including programming language design issues arising from the various extensions of C that have been developed. The module assumes some familiarity with programming in Java, and it will emphasise the difference between C-style languages and Java, such as garbage collection vs memory management and pointers.

Reasoning
This module will introduce automated theorem proving. Both implementation and representation theories are covered as are some applications. It will present automated reasoning; introduce the principal techniques such as resolution, forward and backward chaining; introduce areas of application such as default reasoning, constraint-based reasoning, case-based reasoning, reasoning by analogy and learning through induction.

'Birmingham has one of the UK’s leading cyber security research groups and it is a GCHQ/EPSRC Academic Centre of Excellence. Computer Security is an important part of our second year and many of our students get involved with cyber security research for their final year projects.'

Dr Tom Chothia,
Lecturer in Computer Science
Overview of Year Three

Year three syllabus

<table>
<thead>
<tr>
<th>Year 3 Modules</th>
<th>BSc Computer Science</th>
<th>MSc Computer Science</th>
<th>BSc Artificial Intelligence and Computer Science</th>
<th>BSc Computer Science with Business Management</th>
<th>MEng in Computer Science and Software Engineering</th>
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<td>Advanced Topics in Functional Programming</td>
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<tr>
<td>Compiler Construction</td>
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<td>Computer Science Project</td>
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<tr>
<td>Corporate Finance*</td>
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<tr>
<td>Databases</td>
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<td>Distributed and Parallel Computing</td>
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<td>Enterprise Systems</td>
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<tr>
<td>Graphics</td>
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<td>Individual Study 1</td>
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<tr>
<td>Intelligent Data Analysis</td>
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<tr>
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<td>Nature-Inspired Search and Optimisation Verification</td>
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<td>Networks</td>
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<tr>
<td>Neural Computation</td>
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<td>Operating Systems</td>
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<td>Principles of Programming Languages</td>
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<td>Software Design Study</td>
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<td>Strategic Management A*</td>
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<td>Strategic Management B*</td>
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<td>Supply Chain Management*</td>
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<td>Teaching Computer Science in Schools</td>
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</tbody>
</table>

*These are modules taken outside of the School

Computer Science Project
The final year project enables the student to demonstrate competence as a computing professional and to apply material learned in other components of the degree programme. Projects are chosen from staff suggestions or are developed from the student’s original idea. The project normally includes writing a substantial piece of software or developing some hardware. Occasionally, it can consist of conducting research other than writing software.

Software Design Study
The software design study gives the student the opportunity to work in a team (typically 5 or 6 students) on a challenging and substantial software design project. This will normally include the early phases of the software lifecycle (requirements analysis and software design), but may also include the further development of prototype software and/or demonstration software. The final report must include a fully costed proposal for the development of a complete software product.

Computer-Aided Verification
This module introduces techniques and tools for automatically verifying that computer systems behave as intended, in terms of correctness and reliability. The module will cover the theory and algorithms that underlie modern automatic verification techniques, illustrate their applicability to real-life systems and give hands-on experience of working with state-of-the-art verification software.

Corporate Finance
Attention is given to important aspects of corporate finance in this module, with the main emphasis placed on understanding how technical methods can be applied. Topics include: gearing, dividend policies and financial options.
Strategic Management A and B*
In the first semester work will primarily be in the form of attending lectures to cover the underlying theories of strategic management. The second semester will involve: lectures, writing a case study of a company of your choice in small teams, making presentations and answering questions of your analysis in front of larger groups. A high level of personal and collective effort is required.

Supply Chain Management*
In their attempts to achieve superior profitability for their firms, managers need to consider two critical tasks. First, firms need to position themselves by matching their internal capabilities with external market opportunities to maximise the revenue flowing into the organisation. Second, firms need to organise themselves so that as little of that revenue as possible flows out of the organisation and into the pockets of their suppliers. This module discusses how managers might undertake these critical tasks in an effective manner and also shows that the two tasks are inter-related.

*These are modules taken outside of the School

Student profile
Atif Hussain
BEng Computer Science and Software Engineering with a Year in Industry

What interests you about Computer Science, and why did you decide to study it at Birmingham?
Computer Science is pioneering and hugely exciting. It gives you the ability to work at a local level, but reach out at a global scale. This is the information age, and as such a very interesting time to study computer science, where the rise of social networks like Twitter and Facebook are ubiquitous in daily life, and every business is becoming increasingly electronic.

This University is excellent in terms of career service, employer relationships and extra curricular activities. The staff are the most friendly and intelligent bunch I have ever come across.

Where are you going for your graduate role?
I will be working in the Equities Trading Technology Division, at Goldman Sachs.

How did you get this role and did you use the Careers Service?
I got this role after completing a year placement at Goldman Sachs in between my final and penultimate year. Computer Science was instrumental in getting the role. From providing information regarding vacancies in companies to providing help with CVs and covering letters, the Careers Service was crucial. Moreover the skills and technologies learnt during my time in CS is very well regarded and highly sought after by employers.
Compiler Construction
This module describes the structure of a typical compiler. The phases of compilation, from the front end to analysis and code generation, as well as the main techniques used in each phase will be covered.

Databases
This module begins with a swift recap of the standard database canon: SQL and ER modelling, albeit from a more advanced perspective. This is followed by a discussion of relational algebra and functional dependencies, and their role in verifying and improving the ER model (towards Boyce-Codd normal form). In the second part of the module, the inner workings of a database management system are presented and it is discussed how they impact on query evaluation efficiency. In the final part, transactions and transaction processing will be discussed.

Networks
This module introduces the basic concepts, technologies, architecture and standards involved in computer networks, together with methods for their design and implementation. This will include discussion of data transmission protocols, TCP/IP, LANs and WANs, communication mechanisms and synchronization issues.

Advanced Topics in Functional Programming
This module exposes students to state of the art functional programming languages and presents unusual or unexpected applications of functional programming, such as system-level programming. Students can expect to develop advanced functional programming skills.

Graphics
3D constructive graphics (co-ordinate systems, object and scene design, graphics transformations in 3D – translations, scaling, rotation, viewing); Animation; 2D raster graphics (algorithms for efficient drawing of lines and curves); Images and colour (image representations, image arithmetics, image enhancement, colour models).

Human Computer Interaction
This module will explore some major themes in HCI such as the concept of task analysis, the absence of relevant design formalisms, the cognitive basis of a proposed interaction taxonomy, the notion of self-explanatory tools, and the use of AI techniques in human-computer interaction.

Individual Study 1
This module exists to allow particularly strong students to study, at their own initiative, material that is outside of what can be found in other modules which are available in the School of Computer Science. Learning is by self-managed study under the direction of a supervisor (a member of the academic staff of the School). The topic for a particular student is chosen through negotiation between the student and supervisor early in the semester.

Intelligent Data Analysis
This module introduces a range of state-of-the-art techniques in the fields of statistical pattern analysis and data mining. The ‘information revolution’ has generated large amounts of data, but valuable information is often hidden and hence unusable. Pattern analysis and data mining techniques seek to unveil hidden patterns in the data that can help us to refine search, construct more robust spam filters, or uncover principal trends in the evolution of a variety of stock indexes.

Intelligent Robotics
Artificial Intelligence is concerned with mechanisms for generating intelligent behaviour. When this behaviour occurs in the everyday physical world, with its uncertainty and rapid change, we find that all kinds of new problems and opportunities arise. We will try to understand some of these in the context of robotics. In a series of lectures we will look at some theories of how to sense the real world, and act intelligently in it. In a series of labs you will build your own robots to see how well (or badly) these theories actually work.

Neural Computation
This module introduces the basic concepts and techniques of neural computation and its relation to automated learning in computing machines more generally. It covers the main types of formal neuron and their relation to neurobiology, showing how to construct large neural networks and study their learning and generalization abilities in the context of practical applications.

Principles of Programming Languages
This module explains some fundamental principles of programming languages, such as stack, environment, store and type. We do this for a toy language called ‘call-by-push-value’, in which we represent various familiar programming idioms. We see how the meaning of language features can be described precisely using ‘abstract machines’.

Operating Systems
This module covers basic operating system concepts including; memory management, file systems and threading, and introduces the tools and techniques required to modify and develop operating systems kernel software.
Robots will start to appear all over our world in the near future. We give students the opportunity to study the artificial intelligence and robotics tools and techniques necessary to build autonomous systems that will be able to change our society for the better.

Dr Nick Hawes, Reader in Robotics, Computer Science
Overview of Year Four

Year four syllabus

<table>
<thead>
<tr>
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<th>MSci Computer Science</th>
<th>MEng in Computer Science and Software Engineering</th>
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<tbody>
<tr>
<td>Advanced Computer Interaction (HCI)</td>
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<tr>
<td>Advanced Robotics</td>
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<tr>
<td>Compilers and Languages (Extended)</td>
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<td>Cryptography</td>
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<tr>
<td>Distributed and Parallel Computing (Extended)</td>
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<td>Enterprise Systems (Extended)</td>
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<td>Evaluation Methods and Statistics</td>
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<td>Individual Study 2</td>
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<td>Intelligent Data Analysis (Extended)</td>
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<tr>
<td>Introduction to Neural Computation</td>
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<td>Machine Learning (Extended)</td>
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<td>Mobile and Ubiquitous Computing (Extended)</td>
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<td>Operating Systems (Extended)</td>
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<tr>
<td>Research Topics in HCI</td>
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<tr>
<td>Robot Vision</td>
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<tr>
<td>Secure Programming</td>
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<tr>
<td>Teaching Computer Science in Schools (Extended)</td>
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</table>

Computer Science project M60
The MEng final year project enables the student to demonstrate competence as a software engineer and to apply material learned in other components of the degree programme. Projects are chosen from staff suggestions or are developed from the student’s original idea. The project results in a product related to one or more stages of the software life-cycle.

Compilers and Languages (Extended)
This module describes the structure of a typical compiler. The phases of compilation, from the front end to analysis and code generation, as well as the main techniques used in each phase will be covered.

Teaching Computer Science in Schools (Extended)
Students will gain experience of working in a professional educational environment (a local primary or secondary school) and will learn about the key issues affecting school education today. They will have the satisfaction of making a positive impact on the education of pupils of all ages and the chance to act as a role model for computer science.

Cryptography
This module will present the fundamentals of cryptography, as well as its applications and issues of how cryptography is used in practice.

Intelligent Data Analysis (Extended)
This module studies more state-of-the-art techniques in the fields of statistical pattern analysis and data mining. The ‘information revolution’ has generated large amounts of data, but valuable information is often hidden and hence unusable. Pattern analysis and data mining techniques seek to unveil hidden patterns in the data that can help us to refine web search, construct more robust spam filters, or uncover principal trends in the evolution of a variety of stock indexes.

Network Security
This module introduces the threats and attacks which may be perpetrated on computer networks, and some of the mechanisms designed to address them. Some technology case studies are presented and evaluated.

Operating Systems (Extended)
This module covers basic operating system concepts including memory management, file systems and threading. It also introduces the tools and techniques required to modify and develop operating systems kernel software in C/C++.

Secure Programming
This module covers the basics of software security. Classic design principles for the protection of information in computer systems are introduced. Some of the most important vulnerabilities in current software systems and the corresponding attacks are reviewed. It is then shown how to defend code against these attacks, both by means of careful programming technique and automated machine support.

Individual Study 2
This module exists to allow particularly strong students to study, at their own initiative, material that is outside of other Level M modules that are available in the School of Computer Science. Learning is achieved by self-managed study under the direction of a supervisor (a member of the academic staff of the School). The topic for a particular student is chosen by negotiation between the student and supervisor early in the semester.

Intelligent Robotics (Extended)
Artificial Intelligence is concerned with mechanisms for generating intelligent behaviour. When this behaviour occurs in the everyday physical world, with its uncertainty and rapid change, we find that all kinds of new problems and opportunities arise. We will try to understand some of these issues in the context of robotics. In a series of lectures we will look at some theories of how to sense the real world, and act intelligently in it. In a series of labs you will build your own robots to see how well (or badly) these theories actually work.
Introduction to Neural Computation
This module introduces the basic concepts and techniques of neural computation, and its relation to automated learning in computing machines more generally. It covers the main types of formal neuron and their relation to neurobiology, showing how to construct large neural networks and study their learning and generalization abilities in the context of practical applications. It also provides practical experience of designing and implementing a neural network for a real world application.

Machine Learning (Extended)
This module will provide a good foundation to machine learning. It will compare and contrast human learning with machine learning. It will examine the limitations of machine learning, the role of hypothesis bias and hypothesis representation.

Advanced HCI
This module provides the core underpinning knowledge necessary for further study of HCI. It aims to give students an understanding of the key concepts in cognitive psychology and of the use of cognitive modelling techniques within HCI. The module also provides a survey of HCI methodologies and then examines techniques for HCI design and HCI evaluations in greater depth with students undertaking practical exercises based upon real world examples. There is also a review of the scope of HCI applications.

Advanced Robotics
This module is concerned with robot motion in a physical world. We will introduce the concepts and tools for modeling, simulating, and controlling dynamic robots. In a series of lectures we will study the fundamentals of manipulation including kinematics, dynamics, and control. Lab exercises will reinforce learned concepts by means of evaluation on a (real/simulated) physical robot.

Distributed and Parallel Computing (Extended)
In this module the key concepts at the basis of the design of distributed algorithms and systems are introduced. State of the art distributed systems are reviewed and the current trends in research and industry are analysed.

Enterprise Systems (Extended)
Building on students’ prior knowledge of imperative programming, the module introduces specific technologies and toolkits for building Enterprise systems. Through lectures and extensive practical work, the module prepares students, with good programming skills, to make an effective contribution to building large internet-based systems as professional software engineers.

Evaluation Methods and Statistics
The aim of this module is to provide an introduction to the use of experimental design and statistics for the purpose of investigating human behaviour. The module is targeted at computer scientists with an interest in (i) understanding empirical studies concerning human behaviour, including studies of cognitive, social, and economic behaviour, and (ii) designing and conducting empirical research into the interaction between people and computers.

Mobile and Ubiquitous Computing
This module is concerned with the issues surrounding mobile and ubiquitous computing systems. It examines the particular issues that arise in these systems both from a technical perspective and in terms of usability and interaction.

Nature-Inspired Optimisation (Extended)
Natural Computation is the study of computational systems that use ideas and get inspiration from a variety of natural systems. Its powerful techniques can be applied not only to optimisation but also to learning and design. Example topics covered include variants of local search, evolutionary computation, swarm intelligence, and artificial immune systems. While the focus is on the applications of such techniques, theoretical foundations are also studied.

Networks (Extended)
This module explores more concepts, technologies, architecture and standards involved in computer networks, together with methods for their design and implementation. This will include discussion of data transmission protocols, TCP/IP, LANs and WANs, communication mechanisms and synchronization issues.

Research Topics in HCI
This module supports students in studying current research within the HCI discipline. Several themes will be led by the different academic staff involved. Students will be given an initial set of key papers and guided in their research and analysis of the area selected.

Robot Vision
Vision is one of the major senses that enables humans to act (and interact) in (ever) changing environments. In a similar vein, computer vision should play an equally important role in relation to intelligent robotics. This module will focus on the fundamental computational principles that enable us to convert an array of picture elements into structural and semantic entities necessary to accomplish various perceptual tasks.

'The School of Computer Science at Birmingham has a great mix of theory and system people, which means that, when you’re here, you have the possibility of both delving into really deep theoretical topics and exploring practical implementations of real-world systems.'

Dr Marco Cova,
Lecturer in Computer Science

Lego NXT Robot
Artificial Intelligence explained

As an A level or equivalent student, artificial intelligence is probably one of the areas of computer science that you may know least about. That’s perfectly understandable given that it is surrounded by so much Hollywood hype.

AI is the study of the nature of intelligence by building computer systems, and the application of these insights in solving real-world problems. New AI technologies are being developed constantly but a few areas where Birmingham is active include:

- **Neural Networks** – simulating the work of neurons in the brain. At Birmingham we run a world leading Centre for Computational Neuroscience where such models are compared to human behaviour and brain function.
- **Machine learning techniques** are causing a revolution in computing, being behind several recent headline grabbing company launches and acquisitions. At Birmingham the AI group have machine learning experts working in robotics, computer vision, and to analyse brain signals, galaxy formation, web browsing behaviour and much more.
- **Natural Language Processing** – this means producing computer systems that can communicate in human languages. A team of NLP researchers at Birmingham are finding fast new ways for computers to understand human utterances.
- **Nature Inspired Computing** – in this area students and researchers write software and algorithms to evolve solutions to hard engineering problems. Ideas from Darwinian evolution, ant foraging, molecular computation, and cell signalling are used to inspire new types of computing. Birmingham is home to CERCIA, one of Europe’s largest centres for the applications of Evolutionary Computing, and many Birmingham graduates have gone on to work in the centre.
- **Robotics** – the new wave of robots changing our world are smarter than factory robots. Birmingham has one of Europe’s leading robotics labs, where undergraduates and researchers work to make robots that navigate, speak, see, learn, build maps, and manipulate new objects. The Birmingham Robot Club meets regularly to develop and play with new robot software.

- **Computer Vision** – this includes all aspects of understanding images, including tracking people in video, object recognition, face detection, and understanding medical images (fMRI, X-rays, ultrasound). The school is home to the the UK centre for doctoral training in medical image understanding.

**The applications of AI**

There are a huge number of uses for AI technology, including:

- **Fraud detection systems** which use neural networks and machine learning to detect stolen credit cards by learning customer behaviour
- **Automated trading algorithms** that outperform the market by evolving their stock trading strategies
- **Self-driving cars**, including collision avoidance, self parking, navigation by vision, and complete autonomous driving are now entering the car market
- **Genetic algorithms** are used in scheduling to find the most efficient way to roster staff or allocate resources
- **Medical decision support systems** which are now increasingly used by clinicians to support clinical decision making
- **Call centres and help desks** which often use case based reasoning to provide instructions on how to deal with common problems
- **Forensic analysis** of CCTV images using AI vision technology which is being developed to catch criminals
Birmingham AI Firsts
Birmingham has one of the biggest AI centres in Europe. Here are some Birmingham achievements:

- **SIAscopy** – Birmingham student Symon Cotton invented SIAscopy, a new way of diagnosing skin cancer using medical image understanding to detect cancerous cells.

- **Dora and Bob** – Birmingham AICS graduate, Nick Hawes developed our mobile robot Dora, that explores and maps its world. Dora first appeared at The Science Museum in 2012 and was seen by 12,000 people. Nick is now leading development of Bob, being used as a security guard at G4S headquarters.

- **CERCIA** – Established in 2003 by Professor Xin Yao, CERCIA is the UK’s leading centre for the application of nature inspired computing in industry.

- **Boris the robot** – The UK’s most advanced robot manipulator, and is used by Professors Jeremy Wyatt and Ales Leonardis to develop the next generation of advanced manipulation robots.

- **AI in games** – Birmingham graduates, Stuart Reynolds and Ian Wright are leading figures in the AI for games industry, working at AiLive, the games company in San Francisco that is famous for developing human motion control for the Wii and Playstation.

- **Brain gain** – Birmingham lecturers, Peter Tino and Hamid Deghani are developing ground breaking new ways of understanding the brain through images. This includes new machine learning algorithms to better understand brain imaging, and new brain imaging methods based on shining harmless infrared light onto your head.
What can you do with a degree in Computer Science?

There is so much potential in the real world for Birmingham’s computing graduates. Birmingham is one of the top universities often targeted by prestigious companies when looking for new employees. So whilst graduation may seem a long time away, it is worth considering the competitive advantage you will gain with a Birmingham degree.

Studying an undergraduate degree in Computer Science will develop management skills such as communication, teamwork, time management and report writing.

It will give you a disciplined approach to analysing problems, with the ability to design creative solutions and critically evaluate the results. Employers are impressed by the combination of technical and transferable skills offered by computing graduates, and as such, you might find yourself in a variety of environments in academia, industry, research and commercial organisations, in such areas as:
- Artificial Intelligence – Developing computers that simulate human learning and reasoning ability.
- Computer Design and Engineering – Designing new computer circuits, microchips, and other electronic components.
- Computer Architecture – Designing new computer instruction sets, and combining electronic or optical components to provide powerful but cost-effective computing.
- Information Technology – Developing and managing information systems that support a business or organization.
- Software Engineering – Developing methods for the production of software systems on time, within budget, and with few or no defects.
- Computer Theory – Investigating the fundamental theories of how computers solve problems, and apply the results to other areas of computer science.
- Operating Systems and Networks – Developing the basic software computers use to supervise themselves or to communicate with other computers.
- Software Applications – Applying computing and technology to solving problems outside the computer field – in education or medicine, for example.

What skills will I develop?
Your course will give you a disciplined approach to analysing problems, the ability to design creative solutions and critically evaluate the results. Future employers will be interested in your technical skills, in particular your ability to program in multiple languages, and the transferable skills you’ve developed, such as innovation and the adaptability to cope with rapid change in technology.

Where can I work?
There are many different career paths to explore with a degree in Computer Science. You might choose to work for a technology consultancy like Accenture, CHO Consulting, Logica CMG or PA consulting, or one of the global IT giants such as Microsoft, Oracle, Hewlett Packard and IBM.

You may also decide to pursue opportunities in investment and retail banking and businesses, telecommunications companies and public sector organisations.

Other companies that are of interest to our graduates are: Apple, BUPA, European Space Agency, Expedia.com, Goldman Sachs, HP, Honda, Rolls Royce, QinetIQ, Siemens, Google, Deloitte, Sony, Citibank, UBS, pwc, GCHQ, Credit Suisse, JP Morgan, Morgan Stanley and Bank of England, to name but a few.

You may also wish to pursue postgraduate study before entering employment or embark on an academic career. Our School is home to a wide range of research areas, including AI/Robotics, Natural Computation, Medical Imaging, HCI, Security and Theory of Computation.

For more information on postgraduate study: www.cs.bham.ac.uk/admissions/postgraduate-taught

Source: Adapted from IEEE Computer Society

### Student profile

**Hamzah Salem**  
BSc Artificial Intelligence and Computer Science with a Year in Industry

**What interests you about Computer Science, and why did you decide to study it at University of Birmingham?**

I have been fascinated by computers and electronics from an early age, and with the pace technology changes at, I find it a very interesting field. I made the decision to study at the University of Birmingham after attending an Open Day and speaking to the current academic staff and students at the time.

**Where are you going for your graduate position?**

I have been offered a full-time graduate role with Goldman Sachs International.

**How did you get this role and did you use the Careers Service?**

After attending a presentation, held on campus, by current employees and former students of this University, I applied and was successful in securing a 12 month internship at the company. The knowledge and skills I gained while studying at the University of Birmingham made me a highly competitive candidate. Without the career fairs and events held in this school, searching for jobs would have been a lot more difficult. Having employers attend to provide helpful tips and advice was invaluable.
We have excellent careers and employability links and have a Graduate Prospects score of 91% in The Complete University Guide 2016. Our students go on to secure many different graduate roles within industry, as well as pursuing further study.

As well as a central Careers Network and School-based assistance, Birmingham also has a dedicated service for Computer Science students through the Engineering and Physical Sciences (EPS) Careers Department. Students can access these services throughout their studies.

Learn more:
https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx

What types of job can I get?
The following job titles and their definitions are not standardised within the industry, but they have been chosen to give you a flavour of the variety of opportunities that exist.

- **Applications Developer**: Writes programs for technical, commercial and business users; usually works in a team to create a program to agreed specifications and produce detailed supporting documentation.
- **Artificial Intelligence Developer**: Develop computers that simulate human learning and reasoning ability.
- **Cloud Computing Engineer**: Apply computing and software development to design ways for sharing information and resources over the internet.
- **Database Administrator**: Responsible for the usage, accuracy, efficiency, security, maintenance, administration and development of an organisation’s computerised databases.
- **Financial Computing Analyst**: Apply computational and mathematical methods.
- **Information Systems Manager**: Works with a staff of technical specialists to provide and maintain an organisation’s hardware and software technology infrastructures.
- **IT Consultant**: Gives objective advice on the best use of IT to solve business problems; clarifies client requirements, defines and presents the solutions.
- **Lecturer/Teacher**: Could teach ICT in secondary schools or college after taking a Postgraduate Certificate in Education (PGCE). As a shortage subject it currently attracts additional funding. Around 10% of graduates go on to further study, usually studying in greater depth through an MSc or PhD. This is essential for an academic career in higher education.
- **Mobile Computing and Software App Developer**: Develop internet applications that run on smartphones and other mobile devices.
- **Multimedia Programmer/Computer Games Developer**: Works in a team to write programs that bring together text, sound, artwork, 2D/3D modelling, animation, video and virtual reality to create a multimedia product, eg, for websites and computer games.
- **Network Engineer**: Ensures the server and network infrastructure is maintained to maximise efficiency, involving installing and supporting new servers, hardware and software, allocating resources and providing technical support to end users.
- **Robotics Engineer**: Design, construction and application of robots and computer systems for their control, sensory feedback, and information processing.
- **Security Software Engineer**: Using programming and cryptography to design security systems.
- **Social Computing Engineer**: Develop new technologies to form and extend community networks.
- **Software Engineer**: Researches, designs, tests, implements and maintains software systems to meet client or employer needs; uses a variety of computer programming languages and applications, working in teams with other IT professionals, or alone.
- **Systems/Business Analyst**: Works with a client to improve their information systems or recommend new systems; defines the problem, finds a solution, costs it — produces a project brief and outline design for a systems designer to develop.
- **Systems Designer**: Designs new IT systems from a technical specification, and is responsible for installation, testing and maintenance. The job can incorporate a systems analyst or consultant role.
- **Technical Support Officers**: Monitors and maintains the computer systems and networks of an organisation, installs and configures computer systems, diagnoses hardware/software faults and solves technical problems, either over the phone or face-to-face.
- **Web Designer**: Designs and codes web pages, liaises with and advises clients, creates web pages, adds content and tests the finished site.

What interests you about Computer Science and why did you decide to study it at Birmingham?
I was interested in computers from a young age, especially gaming. As I grew up this interest didn’t fade and by the time I got to Year 12 I knew it was the field I wanted to work in. A degree in Computer Science was no brainer for me. The School has everything we need. There is access to mac, linux and windows machines with a whole suite of software packages, meaning we are exposed to a variety of industry standard software. 24/7 access and a VPN ensures we always have access to the facilities we need.

What are your experiences with the staff in the School?
The staff are fantastic. Everyone is on first name terms and they often socialise with us too. All lecturers have office hours where you will be able approach them and ask them any questions you like regarding subject content you may be struggling with.

What do you intend to do after graduation?
I was determined to do a Year in Industry, and with the help of the fantastic career service was able to attain a placement with General Electric. I worked in the European HQ fleet transport team as part of their IT Leadership Programme. I found out about it when I spoke to a GE representative in the School Atrium at one of our Computer Science career events. The most prominent thing that I noticed when at the interviews is how well prepared my degree course has made me for working life. Employers are always impressed by our course. I thoroughly enjoyed my time at GE and had a very successful year. They extended my contract and offered me a graduate role.

This meant that before I even began final year I had already got a job lined up! The Year in Industry was the best thing I ever did in terms of increasing my employability. Furthermore, it improved my work ethic and my grades for final year are certainly seeing the benefit!

Source: Adapted from www.prospects.ac.uk – the UK’s official graduate careers website.
Joint Honours undergraduate programme

A joint honours degree programme involves the study of two subjects, both to honours degree level – so you work at exactly the same level and to the same academic standard as students taking a single honours programme. You are simply required to choose fewer topics from the range of options available in each half of the programme.

Computer Science at Birmingham can also be combined with Mathematics. There is considerable common ground between Mathematics and Computer Science.

Mathematicians use computers to solve complex equations, analyse large data sets and even to prove theorems. Computer scientists use mathematics to design efficient compression algorithms, to understand the semantics of programming languages and for the theory behind internet security systems. A joint honours degree in Mathematics and Computer Science will allow you to develop many of the skills you would gain from the corresponding Single Honours programmes, with the advantage of studying both of these subjects much more closely.

Why study Joint Honours?
The intellectual range of a Joint Honours degree, together with the communication and organisational skills acquired by combining disciplines, makes you very attractive to employers. A Joint Honours degree also equips you to proceed to a higher degree in either subject area, or to conduct research on a topic that combines your chosen disciplines.

Joint honours programmes offered in conjunction with the School of Computer Science include:

**BSc/MSci Mathematics and Computer Science**

We currently offer the Mathematics with Computer Science programme at both BSc and MSci level (both with the option of a Year in Industry). These degrees are hosted by the School of Mathematics, and applications made will be submitted to them directly.

- BSc Mathematics with Computer Science: UCAS Code: GG14 (Year in Industry option: GGD4)
- MSci Mathematics with Computer Science: UCAS Code: GI11 (Year in Industry option: GG41)

Learn more
To find out more (including modules and options available), please contact:

**School of Mathematics**
Tel: +44 (0)121 414 6587
Email: enquiries@maths.bham.ac.uk
Year in Industry

Competition for graduate jobs is tough so you need to do what you can to stand out from the crowd. Gaining relevant work experience can often give you that point of difference, helping you to develop skills and experience that will enhance your university education and maximise your prospects.

School of Computer Science students all have an excellent opportunity to supplement their studies with a year working in industry. In fact, many of our students go on to work for their year-out employers after graduating.

How does it work?
If you choose this option, you will spend the first two years of your degree at Birmingham, followed by the placement year on a salary, then back to the University for your final year. During your year in industry you will be able to put taught theory into practice, as well as gain valuable experience and skills.

Who will my placement be with?
Several well-known companies sponsor our student prizes and offer work placements, all of which are organised by the University Careers Network and the School of Computer Science Work Placement Officer. To gain a placement you will need to find an opportunity that suits your career goals, present your CV and attend an interview, all of which you will be supported in by our Work Placement Officer.

What will I do?
The School and placement company work together to devise a programme of study for you that is linked to the industrial work. This will include basic skills and project elements. At the end of the year you will be awarded a Certificate of Industrial Studies.

Year in Industry placements
Companies hosting our students include UBS, Goldman Sachs, BAE Systems, Microsoft Studios, RIM, Caterpillar, General Electric, IBM and Google, amongst others.

Learn more
Contact our Industrial Placements Tutor (IPTutor@cs.bham.ac.uk) or talk to our Year in Industry students in our new Applicant FB Group (email ug-admissions@cs.bham.ac.uk for details).

Student profile

Luke Cross
BSc Computer Science with a Year in Industry

What interests you about Computer Science, and why did you decide to study it at Birmingham?
My original interest in Computer Science sprouted when I undertook A level Computing at Sixth Form. The challenges that are associated with the subject and problem solving skills needed are always something that has interested me. When I came to an Open Day I was impressed by the friendly atmosphere and knew I would fit in. This decision was then solidified when I attended a Computer Science Applicant Visit Day, where there were friendly and helpful students to help answer any questions or worries I had about the course.

Where did you go for your Year in Industry?
I was lucky enough to secure a year in industry placement at Microsoft and worked in a Microsoft Game Studio in London as a Software Developer Engineer in Test.

How did you get this role and how did the School of Computer Science help in getting it?
Over the course of the year while I was applying for roles there were two careers fairs in Computer Science – a finance one and a software based one. Companies came just to talk to us which was really useful. I started off the process by preparing my CV and application, and then applying to a few companies I was interested in working for. I undertook online tests, video interviews and assessment centres and used the Careers Network Service for advice and to have my CV checked for errors and receive valuable feedback.

Did you enjoy your placement, and do you think it will benefit your degree/career?
Over the course of my internship I have been welcomed into different teams, treated as a full time employee and been faced with new challenges day by day. I have thoroughly enjoyed the time spent on my placement and believe it has readied me for an exciting career in technology after my studies. I believe this placement has not only been a huge boost for my CV but also helping me excel in my personal development with both practical and soft skills.
International study opportunities

Experience new cultures, meet new people, see more of the world… all while continuing your studies. That’s what a year of study abroad can offer you – enhancing your learning, expanding your horizons and offering you an experience to be remembered throughout your university and professional life.

The Benefits
The benefits from participating in a year abroad include:
- Developing relevant, marketable skills – problem solving, communication, patience and perseverance, determination, self-motivation, analytical and study skills
- Academic or subject related reasons – experience a different academic environment and way of teaching
- Enhanced career prospects – employers more likely to choose you with additional offerings other than just your degree
- Language and culture – opportunity to be genuinely immersed into another culture rather than just being a traveller
- Personal development – increased confidence and ability to deal with difficult situations and unfamiliar surroundings
- Contacts – build worldwide relationships that can last a lifetime and benefit you in years to come
- Students who have studied abroad say that it is the best year of their lives

Am I eligible?
All students enrolled on the BSc or MSci Computer Science course are eligible to take part in the Erasmus or Universitas 21 Student Mobility Programme. This means that you will spend your penultimate year at an approved institution in another country, returning to Birmingham for your final year.

What are my options?
The University of Birmingham has an excellent international reputation and we are proud of the growing opportunities for our Computer Science students to study overseas at one of our partner institutions.

Erasmus (Europe)
Erasmus (European Community Action Scheme for the Mobility of University Students) is the European Commission’s educational programme for Higher Education students, teachers and institutions. As one of the largest exchange programmes in the UK, Erasmus encourages students to move around within the EU, strengthening educational, cultural and linguistic interchange. As part of this, the University of Birmingham has more than 140 partner institutions throughout Europe.
Within the School of Computer Science in particular, the programme is available at several European universities, including:
- Germany (Aachen)
- France (Lyon)

International Partner Universities
We have international partner universities all over the world that offer study opportunities for our students. Countries include: Argentina, Australia, Brazil, Canada, Chile, China, Ecuador, Ghana, Israel, Japan, Korea, Malaysia, Mexico, New Zealand, Singapore, Uruguay, USA and the West Indies.

'\[I \text{ would strongly encourage all students to study abroad. For the majority, this is the only opportunity they will ever have to spend an extended period of time living in another country. Many students tell me that the experience has transformed their lives, and many graduates have told me that studying abroad was the thing that really launched their careers. The University of Birmingham has a fantastic array of international exchange partners, and so we are able to offer students the chance to be truly immersed in other cultures.}\]

\textit{Angela Turton, Head of International Mobility}'}
Applications and admissions

At the School of Computer Science, we welcome applications from highly motivated and well-qualified students. We understand that this is most likely an unfamiliar experience for you, therefore if you have any questions about your application please do not hesitate to contact our Computer Science Admissions Team, who will do all they can to help.

How to apply
All applications for undergraduate degree programmes must be made through the Universities and Colleges Admissions Service (UCAS) using their secure online application system at www.ucas.com/students/apply.
When completing your UCAS application form you will need our institution codes which are:
- Institution Code Name: BIRM
- Institution Code: B32

When to apply
The majority of applications to our school are received during the months of September to December each year. There is the opportunity to apply up until the middle of January, however an early application is recommended so that you can take full advantage of the Applicant Visit Days offered from November each year.

Invitations to attend a School of Computer Science Applicant Visit Day are sent to all applicants who have been made an offer, and it is strongly recommended that you try to attend. It is a great day and an excellent opportunity to meet and ask questions of our academic staff and current students, attend subject talks, demonstrations and experience our fantastic department and campus. We also use the day to get to know our offer holders better, which can be very useful during Confirmation and Clearing. If you are offering non-standard qualifications we may ask you to attend an Applicant Visit Day before we make you an offer, so that we can gather further information in order to make a decision. We would advise that you contact us informally to discuss this first via: ug-admissions@bham.ac.uk

UK applicants are only considered for an Excellence Scholarship (worth up to £3000) if they have attended an Applicant Visit Day, chosen Birmingham as their Firm Choice by 1st August, and have satisfied their offer conditions. EU and International applicants are warmly invited to attend an Applicant Visit Day, but we realise that this is most likely impractical. EU applicants are considered for the Excellence Scholarships using other means. The Scholarship Committee will meet in August and contact all successful applicants then.

International applicants are considered for the International Scholarship, using different criteria. Please contact us at: ug-admissions@cs.bham.ac.uk if you have any questions. For further information regarding Computer Science Scholarships, please see page 34.

Campus tours
If you are unable to attend, the University also offers guided tours every Tuesday and Thursday, where you will be shown around by a current student. However we strongly advise that you try to attend our Applicant Visit Day. Places are strictly limited and need to be booked one week in advance. To receive an information pack or book a place, please contact Student Recruitment and Outreach.

Tel: +44 (0) 121 414 3374
Email: c.a.cox@bham.ac.uk
UCAS key dates
- 1 September – Opening date for receipt by the UCAS office of applications for admission
- Mid January – Last date for receipt of applications from all UK/EU students
- End of June – Last date for receipt of applications from international students

English Language requirements
If English isn’t your first language you will need to offer an acceptable English language qualification. Visit: www.birmingham.ac.uk/undergraduate/requirements/international/index.aspx for a list of acceptable English language qualifications for our degrees and the latest required grades.

Coming to study with us from outside the UK?
We look forward to welcoming you if you are coming to study with us from outside the UK. Our School is a really friendly mix of people from different countries and backgrounds and is a very welcoming place. However we know that coming to a new country to study can be a little daunting, and you might have all sorts of questions you want to ask beforehand. We’ve got a great team of International CS ambassadors ready to talk to you and answer anything you’d like to ask.

Visit: www.cs.bham.ac.uk/admissions/undergraduate/ambassadors

What interests you about Computer Science, and why did you decide to study it at Birmingham?
Computing has always been a personal interest, so it was an easy choice to make for my future career. I visited a large amount of Universities, and Birmingham stood out, thanks to its high status, great Computer Science Department and amazing campus, location and facilities.

Where are you going for your graduate position?
I will be joining HMGCC (Her Majesty’s Government Communication Centre) as a Graduate Software Engineer. I am very proud to be taking on this role as I feel it is an amazing opportunity for someone straight out of University, becoming a Civil Servant for the British Government.

How did you get this role and did you make use of the Careers Service?
I attended an interview at which I undertook Character, Technical and Psychological assessments. My education clearly helped me with the technical part of the interview, as I was able to answer the questions on programming, software engineering and operating systems well. The careers fairs in Computer Science are a great place to meet potential future employers and to forge links with people that may help you secure jobs.
Money matters: Fees, funding, scholarships and bursaries

Our School is proud to offer an impressive range of scholarships and bursaries for both Home/EU and International students wishing to study for an undergraduate degree in a Computer Science subject. Scholarships are awarded to students who have, or expect to achieve, excellent academic results.

At Birmingham and in the UK, we ensure that financial barriers to entry are removed wherever possible, by offering a wide range of additional financial support packages in the form of loans, grants and scholarships.

Two of the main costs associated with undergraduate study are tuition fees and living expenses. Options are available in different forms, depending on your individual circumstances.

Financial support for Home/EU students
There are two types of student loan available; one to cover your tuition fees and the other to contribute towards your living costs.
- UK/EU students can take advantage of financial support for tuition fees offered by the Student Loans Company (www.slc.co.uk), the agency that administers grants and loans to Home/EU students in higher education in the UK.
- UK students can also apply for a Maintenance Loan (and in some cases, a Maintenance Grant) to assist with living expenses provided by the UK government. The amount you can borrow is determined by your household income and where you are intending to study (www.gov.uk/student-finance/loans-and-grants). EU students are not eligible for this and are advised to contact their home country with regards to financial support for living costs incurred whilst studying in the UK.

Visit: www.facebook.com/SFEngland to keep up to date with local developments.

Financial support for International students
If you are an international student, you will not be eligible for any financial assistance from the UK government. However we recommend contacting your home country to determine if there is any financial support available for international students studying in the UK. You may also find it useful to visit: www.birmingham.ac.uk/International/students/finance/index.aspx

Paying your tuition fees
We recognise that our students have different requirements for paying their tuition fees. This is why we are committed to providing a range of payment options to suit everyone. These will allow you to pay your fees in full before or after registration, or to spread the cost over manageable instalments by direct debit.

Please visit: www.payments.bham.ac.uk to find out more.

University scholarships, grants and bursaries
The University offers a range of additional financial support for students studying at Birmingham in the form of bursaries, grants and scholarships. For more information please visit: www.birmingham.ac.uk/undergraduate/fees/funding/index.aspx

School of Computer Science Scholarships
We offer a number of Home/EU and International Scholarships:

Home/EU:
- Outstanding Achievement Scholarship: £3000 award, conditional upon meeting certain criteria, which includes attending one of our Applicant Visit Days. Please visit: www.cs.bham.ac.uk/admissions/undergraduate/scholarships to learn more.

International:
- An 'Entry Bursary' of £1500 will be awarded to all students who are categorised as overseas for fee purposes and who obtain AAA or equivalent
- An additional ‘Excellence Scholarship’ of £1900 will be awarded to international students who obtain exceptional academic results (A*AA or equivalent). This Scholarship will be awarded for first year only.

If you have dependent children, or you have a disability or learning difficulties, extra support may be available. For more information visit www.direct.gov.uk/studentfinance

All students
For further, up-to-date information on all fees and funding support and to talk to our Funding Office directly about your individual circumstances, visit: www.birmingham.ac.uk/undergraduate/fees/index.aspx
What our students say

"On arrival, I was struck by how close-knit and friendly the School felt. Students from all years made me feel welcome, and I was surprised by the enthusiasm of lecturers – who are always happy to stop for a chat."

George Brighton, 4th Year, MEng Computer Science and Software Engineering

"I picked Birmingham because of its Computer Science Department. The degrees have a great module content, and the School has a welcoming, intellectual and active atmosphere."

Hung Huang, 2nd Year, BSc Artificial Intelligence with Computer Science.

"What our students say was really friendly and helpful. I was then invited to chat via Skype with a lecturer, who was really friendly and helpful. He asked if there was anything I needed to know and afterwards sent me four emails in a couple of hours highlighting what I asked for, with helpful links. That really helped me decide to choose Birmingham, as it is nice to know that even though you’re moving away from everything that you know, there would be someone who would go out of their way to help!"

Gwendolyn Wong, 2nd Year, BSc Artificial Intelligence with Computer Science.

"Computer Science at the University of Birmingham has been the perfect choice for learning everything I’d need for the kind of things that interest me. The course covers all of the essentials that make you feel like a real pro, and even throws in some extra subjects that really expand your knowledge. As a whole, this entire experience has been exhilarating – the best choice I could have made!"

Jordan Bell, 2nd Year, BSc Computer Science

"Picking Birmingham was the best decision I have ever made. The course has been really engaging and I’ve loved every minute of it. I have made many new friends from different years and have also been able to build good relationships with lecturers and staff."

Tom Sammons, 3rd Year, BSc Computer Science

"I live locally, and being ranked so highly, Birmingham was my first choice. The facilities are fantastic and the staff have been incredibly helpful. I was initially nervous about coming to university, but as soon as I walked out of the train station at Birmingham I knew I’d made the right decision."

Helen Crump, 3rd Year, BSc Computer Science with a Year in Industry

"Computer Science with Business Management delivers the best of both worlds. The course combines the core concepts of programming and software engineering with subjects that enable students to develop and build on key management skills such as finance and marketing. This, together with passionate lecturers and first-class academic and sporting facilities, continuously reassures me that the University of Birmingham is the place for me."

Bhonae Tayali, 3rd Year, BSc Computer Science with Business Management

"What impressed me most about Computer Science at Birmingham was the friendliness of staff and how open everyone was. Our self-contained campus gives you a sense of unity but at the same time we are very close to the city centre.

If you are coming far or from another country, don’t worry too much about adapting, there’s something for everyone here and it will soon become home!"

Diana Murgulet, 2nd Year, BSc Computer Science with Year in Industry (President of the Computer Science Society)

"Coming from Northern Ireland I was going to take the easy choice and stay at home for University, but then I got to see Birmingham at an Applicant Visit Day and my mind changed instantly. The campus is beautiful and is in a nice location. Everyone I met has been incredibly friendly and helpful. My favourite experience this year has been meeting people with different, diverse backgrounds."

Christina Ermondkonchay, 1st Year, BSc Computer Science with Year in Industry

www.birmingham.ac.uk

This brochure was written several months in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that not all programmes or all courses are offered every year. Also, because our research is constantly exploring new areas and directions of study some courses may be dropped and new ones offered in their place.